



Computer Aided Design Technology

Program of Studies
2015-2016



Computer Aided Design Technology

Program Area Course Title	Post- Secondary Connection	Valid Course Code	Recommended Grade Level				Recommended Credit
			9	10	11	12	
Architectural Design	CAD 220	480116		X	X	X	1
Advanced Dimensioning and Measurement	CAD 240	470924		X	X	X	1
Construction Drafting (Techniques)	CAD 230	480119		X	X	X	1
Co-op I (CAD)	CAD 299	480142			X	X	1
Engineering Graphics	CAD 112	480113	X	X	X	X	1
Industrial Drafting Processes	CAD 212	480127		X	X	X	1
Intermediate Computer Aided Drafting	CAD 200	480112	X	X	X	X	1
Internship (CAD)	CAD 298	480145			X	X	1-3
Introduction to Architecture	CAD 120	480117		X	X	X	1
Introduction to Computer Aided Drafting	CAD 100	480110	X	X	X	X	1
Introduction to Surveying (for CAD)	CAD 108	480104	X	X	X	X	.5 - 1
Mechanical Design	CAD 222	480135		X	X	X	1
Parametric Modeling	CAD 201	480136		X	X	X	1
Special Problems (CAD)	CAD 293	480179		X	X	X	1

Last revised May 15, 2015

Overview of Computer Aided Design Technology Education

Purpose

The vision of Computer Aided Design Technology Education is to promote safety and performance standards, enhance leadership skills, and provide relevant curriculum vital to the education of all students.

Computer Aided Design Technology Education will:

- Operate as the venue for nationally recognized industry standard training.
- Provide a critical link in school to employment or postsecondary education.
- Develop stronger relationships with the community in terms of mutual advocacy, cooperative field experiences, employment placement, and support for relevant student organizations and competitions.
- Represent an important component in the education of all students.
- Require and promote critical thinking and problem solving.
- Offer an up to date curriculum based on standards that adapt to changes in the industry.
- Integrate academic skills to insure that students develop written and verbal communications skills, computational skills, and scientific/math problem-solving skills.

Career Pathways

- *Civil Designer*
- *Mechanical Designer*
- *Architectural Designer*
- *CAD Manufacturing TRACK*

Standards Based Curriculum

The CAD curriculum is composed of standards-based competencies. All CAD programs incorporate industry and common core standards thus increasing the student's qualifications toward successful employment.

Alignment of the CAD curriculum with nationally recognized industry standards and the common core standards provides optimal preparation for students to acquire an industry certification.

Communities understand that this preparation provides better career opportunities for students and the demands of today's workforce for the 21st century.

Kentucky Occupational Skill Standards

The Kentucky Occupational Skill Standards are the performance specifications that identify the knowledge, skills, and abilities an individual needs to succeed in the workplace. Identifying the necessary skills is critical to preparing students for entry into employment or postsecondary education. These standards describe the necessary occupational, academic, and employability skills needed to enter the workforce or post-secondary education in specific career areas. There is an ongoing effort to continue to refine these standards by which exemplary Career and

Technical Education Programs are evaluated and certified. This helps insure that curriculum meets industry specifications.

2014 – 2015 Valid Industry Certification and KOSSA List

Work Based Learning

Cooperative experience, internships, shadowing and mentoring opportunities provide depth and breadth of learning in the instructional program and allow students to apply the concepts learned in the classroom. The Work Based Learning Manual is available on the KDE webpage: www.education.ky.gov.

Student Organizations and Competitions

Participation in SkillsUSA competitions provides a vehicle for students to employ higher order thinking skills, interact with high-level industry representatives and enhance leadership skills through participation in regional, state and national competitive events and activities.

**COMPUTER AIDED DESIGN (CAD)
CAREER PATHWAYS
2015-2016**

**CIVIL DESIGNER
CIP 15.1301.01**

PATHWAY DESCRIPTION: Civil Designers apply technical knowledge and skills to develop working drawing and electronic simulations in support of civil engineers, geological engineers, and related professionals. Includes instruction in basic civil engineering principles, geological and seismographic mapping, machine drafting, computer-aided drafting (CAD), pipe drafting, survey interpretation, and blueprint reading.

BEST PRACTICE CORE

**EXAMPLE
ILP-RELATED
CAREER TITLES**

*Foundational Skills Necessary for Career-Ready Measure:
(KOSSA/Industry Certification)*

*Complete (3) **THREE CREDITS:***

- 480110 Introduction to Computer Aided Drafting
- 480112 Intermediate Computer Aided Drafting
- 480104 Introduction to Surveying OR
480113 Engineering Graphics

*Choose (1) **ONE CREDIT** from the following:*

- 480127 Industrial Drafting Process
- 480136 Parametric Modeling
- 480145 Internship I
- 480135 Mechanical Design
- 480142 Cooperative Education I (CAD)
- 480179 Special Problems (CAD)
- 219901 Introduction to Engineering Design (**PLTW**)

Note: (PLTW) courses require an agreement between Project Lead the Way and the Local School District.

Engineer Technician
Architectural Engineer
Electrical Engineer
Industrial Engineer
Mechanical Engineer
Civil Engineer

**COMPUTER AIDED DESIGN (CAD)
CAREER PATHWAYS
2015-2016**

**MECHANICAL DESIGNER
CIP 15.1301.02**

PATHWAY DESCRIPTION: Mechanical designers have a working knowledge of mechanical parts as well as computer-aided design (CAD) software, such as AutoCAD and SolidWorks. Mechanical designers work with project managers, engineers, and clients to understand the needs and requirements for a new product or mechanical system. For example, designers working on a project to create an automobile engine may consult engineers regarding which structural materials to use or clients regarding engine efficiency requirements. Once materials and specifications have been determined, designers begin using CAD software to plan and develop models.

BEST PRACTICE CORE

*Foundational Skills Necessary for Career-Ready Measure:
(KOSSA/Industry Certification)*

*Complete (3) **THREE CREDITS:***

- 480110 Introduction to Computer Aided Drafting
- 480136 Parametric Modeling
- 480113 Engineering Graphics

*Choose (1) **ONE CREDIT** from the following:*

- 480135 Mechanical Design
- 480127 Industrial Drafting Process
- 470924 Advanced Dimensioning and Measurement
- 480112 Intermediate Computer Aided Drafting
- 480145 Internship I (CAD) OR
480142 Cooperative Education I (CAD)
- 480179 Special Problems (CAD)
- 219901 Introduction to Engineering Design (**PLTW**)

Note: (PLTW) courses require an agreement between Project Lead the Way and the Local School District.

**EXAMPLE
ILP-RELATED
CAREER TITLES**

Engineer Technician
Electrical Engineer
Industrial Engineer
Mechanical Engineer
Civil Engineer

**COMPUTER AIDED DESIGN (CAD)
CAREER PATHWAYS
2015-2016**

**ARCHITECTURAL DESIGNER
CIP 15.1301.03**

PATHWAY DESCRIPTION: Architectural Designers apply mathematical and scientific principles to building design, concentrating on structural demands and functionality while taking into account economic and safety factors. Architectural Designers need to be able to diagram designs manually as well through computer-aided drafting (CAD). Design systems are created for a building pertaining to, for instance, heating and air conditioning, lighting and plumbing. Also included are concerns and detail to landscape architecture and crossovers such as environmental design.

BEST PRACTICE CORE

*Foundational Skills Necessary for Career-Ready Measure:
(KOSSA/Industry Certification)*

*Complete (3) **THREE CREDITS:***

- 480110 Introduction to Computer Aided Drafting
- 480117 Introduction to Architecture
- 480116 Architectural Design

*Choose (1) **ONE CREDIT** from the following:*

- 480127 Industrial Drafting Process
- 480113 Engineering Graphics
- 470924 Advanced Dimensioning and Measurement
- 480179 Special Problems (CAD)
- 480112 Intermediate Computer Aided Drafting
- 219901 Introduction to Engineering Design (**PLTW**)
- 480145 Internship I (CAD) OR
480142 Cooperative Education I (CAD)

Note: (PLTW) courses require an agreement between Project Lead the Way and the Local School District.

**EXAMPLE
ILP-RELATED
CAREER TITLES**

Engineer Technician
Architectural Engineer
Electrical Engineer
Civil Engineer

**COMPUTER AIDED DESIGN (CAD)
CAREER PATHWAYS
2015-2016**

**CAD MANUFACTURING TRACK
CIP 48.0500.99**

PATHWAY DESCRIPTION: The CAD Manufacturing TRACK is designed as a pre-apprenticeship pathway for technical students to enter industry. Through the collaboration of local industry, technical school, program instructor, student and parents, a pre-apprenticeship agreement is signed. Local industry chooses 4 courses related to the required skills that will prepare the student to enter a four year apprenticeship sponsored by the company. Upon graduation the student, under the discretion of the company, may be awarded reduced apprenticeship time or start at a higher wage.

BEST PRACTICE CORE

*Foundational Skills Necessary for Career-Ready Measure:
(KOSSA/Industry Certification)*

*Complete (4) **FOUR CREDITS:***

- (4) Core courses chosen from the CAD valid course list by the company sponsoring a State Registered Apprenticeship.

**EXAMPLE
ILP-RELATED
CAREER TITLES**

Engineer Technician
Architectural Engineer
Electrical Engineer
Industrial Engineer
Mechanical Engineer
Civil Engineer

The Tech Ready Apprentices for Careers in Kentucky (*TRACK*) pre-apprenticeship program is a partnership between The Kentucky Department of Education's Office of Career and Technical Education and The Kentucky Labor Cabinet to provide pre-apprenticeship career pathway opportunities into registered apprenticeship programs to secondary students. This is a business and industry driven program to create a pipeline for students to enter post-secondary apprenticeship training.

Upon successful completion, the student will be awarded an industry certification by the employer or training organization through The Kentucky Labor Cabinet and all on-the-job hours worked will be counted towards the apprenticeship, if applicable. The certification will also count towards the local school district's college and career ready accountability index.

The specifics of the *TRACK* program vary and interested parties will need to confer with the Office of Career and Technical Education for the implementation process. There are no costs involved except wages for the student employee. The employer must have a registered apprenticeship program with The Kentucky Labor Cabinet. For more information, please refer to: <http://education.ky.gov/CTE/cter/Pages/TRACK.aspx>

As career pathways continue to expand, the ultimate rationale is that if an employer is willing to implement a Registered Apprenticeship program, a pipeline at the secondary level can be developed utilizing the *TRACK* program.

COMPLEMENTARY OR ADVANCED COURSEWORK BEYOND CAD PATHWAY(s)

Upon completion of a pathway, additional coursework to enhance student learning is encouraged. Credits earned in Advanced or Complementary Coursework “Beyond the Pathway” may not be substituted for pathway courses in order to achieve Preparatory or Completer status.
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|---|
| <ul style="list-style-type: none">• Career Options |
| <ul style="list-style-type: none">• JAG Courses |
| <ul style="list-style-type: none">• 480179 Special Problems (CAD) |

COLLEGE/UNIVERSITY		Kentucky Technical College or University		CLUSTER		Manufacturing Technology	
HIGH SCHOOL (S):		KY County High School		PATHWAY:		Computer Aided Design Engineer	
				PROGRAM:		Computer Aided Design Technology	
GRADE	ENGLISH	MATH	SCIENCE	SOCIAL STUDIES	REQUIRED COURSES RECOMMENDED ELECTIVE COURSES OTHER TECHNICAL EDUCATION COURSES	CREDENTIAL CERTIFICATE DIPLOMA DEGREE	Occupations
9	English 1	Algebra I - Part 1	Earth Space Science	ROTC I or World Geography	480110 Intro to CAD; KCITCS CAD 100	480136 Parametric Modeling.	
10	English II	Algebra I - Part II	Biology I Physics or Chemistry	World Civics US History	History and PE Appreciation of Fine Arts 480112 Intermediate CAD; KCITCS CAD 200 480117 Intro to Architecture; KCITCS CAD120	480113 Engineering Graphics; KCITCS CAD 100 480136 Parametric Modeling. 480137 Intro to Architecture; KCITCS CAD120	(AutoDesk Certified User) (Inventor Certified User) Autodesk Revit Certified User
11	English III	Algebra II	Chemistry	US History	Elective	480116 Architectural Design; KCITCS CAD 220	HS Diploma; TRACK Pre-Apprenticeship
12	English IV	Pre-Calculus	Elective	Elective	Elective	DFT 233 Special Problems (CAD)	
Year 13	ENG 101 Writing I	Humanities	Math	Social Science 3 hrs	Science	Oral Communications	Asst/Lead Community & Technical College
Year 14	Electives 6 hrs	DFT 292 Industrial Applications	ADFT 252 Commercial Detailing	ADFT 262 Working Drawings	DFT 212 Industrial Drafting	DFT 222 Mechanical Design	AAS Degree
Year 15	Math 6 hrs	Physical Science 3 hrs	Computer Science 3 hrs	Social Science 3 hrs	Practical Living 3 hrs	Electives 3 hrs	Morehead State University
Year 15 & 16	IEI 303 3hrs	IEI 310 3 hrs	IEI 317 3 hrs	IEI 319 3 hrs	IEI 320 3 hrs	IEI 327 3 hrs Applied	IEI 330 3 hrs
Year 16	Materials Science IEI 371 1 hr	Engineering Economics IEI 419 3 hrs	Lean Systems IEI 422 3 hrs	Quality Control IEI 430 3 hrs	Facilities Management IEI 519 3 hrs	Industrial Management Senior Project 3 hrs	Industrial Design Electives 3 hrs
	Seminar	Management	Industrial Safety	Management	Experiments	3 hrs	BS Degree in Engineering Technology
Computer Engineer, Architect							
Note: Categories of courses (e.g. Required, Recommended Electives, other Electives and career and technical education) apply to both secondary and postsecondary levels.							

Architectural Design
Valid Course Code: 480116

Course Description: Combines the elements and fundamentals of architectural design with the theory and application of presentation techniques. Deals with site selection, use of materials in design, spatial relationships, and aesthetics. Traditional and contemporary design, designers, processes, and historical milestones are explored. Board and computer techniques are used in illustrating interiors of student designs.

Prerequisites: Introduction to Architecture - 480117

Content/Process

Students will:

1. Demonstrate and practice safe work habits in the lab area.
2. Identify symbols and materials used with the floor plan.
3. Draw a residential floor plan.
4. Use appropriate dimensioning techniques for architectural drawing standards.
5. Use drafting references and vendor product catalogs.
6. Draw residential elevation drawing.
7. Draw and dimension presentation elevations.
8. Construct accompanying drawings to the floor plan, including foundation, framing, electrical, plumbing, heating, ventilation and air conditioning.
9. Identify material representations in plan and section views.

Connections

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- AutoDesk Industry Standards
- SolidWorks Industry Standards
- KCTCS Course: CAD 220
- CTSO - SkillsUSA

Advanced Dimensioning and Measurement

Valid Course Code: 470924

Course Description: Presents an in-depth study of advanced industrial dimensioning principles, tolerances, fits, and A.N.S.I. standards. Exploration of the shape and geometric characteristics of parts through geometric tolerance.	
<i>Prerequisites: Engineering Graphics - 480113</i>	
Content/Process	
Students will: <ol style="list-style-type: none"> 1. Define terms and principles used in advanced dimensioning. 2. Apply using drawing practices, tolerance dimensioning on mating parts. 3. Explain and work with A.N.S.I. standards. 4. Demonstrate surface texture symbols and surface finish. 5. Compare conventional tolerancing with Geometric Dimensioning and Tolerancing. 6. Establish a basic understanding of Geometric Dimensioning and Tolerancing. 7. Analyze specific graphic designs and determine the proper location for dimensions. 8. Define terms and principles relating to Dimensional Metrology. 9. Demonstrate a working knowledge of basic hand held measuring instruments. 10. Measure with basic hand held measuring instruments. 11. Explain the relationship of precision measurement to manufacturing and design. 12. Demonstrate a working understanding of one-tenth of an inch or one-thousandth of an inch. 	
Connections	
<ul style="list-style-type: none"> • Common Core Standards • KOSSA • Common Core Technical Standards • New Generation Science Standards • AutoDesk Industry Standards • SolidWorks Industry Standards • KCTCS Course: CAD 240 • CTSO - SkillsUSA 	

Construction Drafting (Techniques)

Valid Course Code: 480119

Course Description: This lecture and lab course covers the elements for constructing standard residential and commercial buildings. Wood frame, solid masonry veneer, concrete, and steel construction details are explored. Students will learn essentials of standard construction details, which illustrate the various construction methods and will develop a portfolio for those techniques.

Prerequisites: Introduction to Computer Aided Drafting - 480110

Content/Process

Students will:

1. Demonstrate and practice safe work habits in the lab area.
2. Construct residential foundation plans.
3. Construct residential floor framing plans.
4. Construct residential wall framing plans.
5. Construct residential roof framing plans.
6. Construct detailed drawings of reinforced concrete.
7. Construct detailed drawings of typical wood frame sections.
8. Construct detailed drawings of concrete blocks and masonry units.
9. Draw stair plans and details.
10. Draw fireplace plans and sections.
11. Construct cross section for residential plan.
12. Construct section drawings of roofs with parapets.

Connections

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- AutoDesk Industry Standards
- SolidWorks Industry Standards
- KCTCS Course: CAD 230
- CTSO - SkillsUSA

Co-op I
Valid Course Code: 480142

Course Description: Cooperative Education provides supervised on-the-job work experience related to the student's educational objectives. Students participating in the Cooperative Education program receive compensation for their work. This course can be repeated.

Prerequisite: Permission of Instructor

Content/Process

Students will:

1. Demonstrate and practice safe work habits in the lab area.
2. Gain career awareness and the opportunity to test career choice(s).
3. Receive work experience related to career interests prior to graduation.
4. Integrate classroom studies with work experience.
5. Receive exposure to facilities and equipment unavailable in a classroom setting.
6. Increase employability potential after graduation.
7. Earn funds to help finance education expenses.

Connections

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- AutoDesk Industry Standards
- SolidWorks Industry Standards
- KCTCS Course: CAD 299
- CTSO - SkillsUSA

Engineering Graphics
Valid Course Code: 480113

Course Description: This course includes exploration of lines and planes as they relate to orthographic projection to show the size and shape of objects. Instruction includes application of principles and graphic elements of sectioning to show interior detail; the techniques involved in creating oblique projections, axonometric projections, and perspective drawings; and the dimensioning techniques and symbol usage common to all drafting disciplines.	
Content/Process	
Students will: <ol style="list-style-type: none">1. Demonstrate and practice safe work habits in the lab area.2. Construct drawings of basic sectional views.3. Apply dimensioning techniques.4. Construct title blocks, revision blocks, materials list, and tolerancing blocks.5. Freehand sketch orthographic and pictorial views.6. Construct axonometric drawings.7. Construct oblique drawings.8. Construct one-point perspective.9. Construct two-point perspective.	
Connections	
<ul style="list-style-type: none">• Common Core Standards• KOSSA• Common Core Technical Standards• New Generation Science Standards• AutoDesk Industry Standards• SolidWorks Industry Standards• KCTCS Course: CAD 112• CTSO - SkillsUSA	

Industrial Drafting Processes

Valid Course Code: 480127

Course Description: This course explores weldment design, welding symbols, welding processes, and fabrication techniques, tool and die, and jig and fixture drawings. Design specifications, pattern drawings, casting, forming processes, and mechanical drawing principles in relation to the manufacturing industry, and screw-thread design and related fastening concepts as they relate to manufactured items and construction are also included.

Prerequisite: Introduction to Computer Aided Drafting - 480110

Content/Process

Students will:

1. Demonstrate and practice safe work habits in the lab area.
2. Identify and use welding symbols on fabrication drawings.
3. Construct welding assembly drawings.
4. Construct casting drawings.
5. Construct forging drawings.
6. Construct jig and fixture drawings.
7. Construct tool and die drawings.
8. Identify, specify, and construct drawings of fasteners.
9. Construct and dimension keyway and keyseat drawings.
10. Construct detailed, schematic and simplified thread drawings.
11. Construct spring drawings.

Connections

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- AutoDesk Industry Standards
- SolidWorks Industry Standards
- KCTCS Course: CAD 100
- CTSO - SkillsUSA

Intermediate Computer Aided Drafting

Valid Course Code: 480112

Course Description: Students will use CAD software to produce advanced two- and three-dimensional object drawings; advanced techniques of drafting, layering, and symbols associated with one or more design applications; calculations of perimeters, areas, and mass associated with the drawings. (*PROJECT LEAD THE WAY COMPONENT*)

Prerequisite: Introduction to Computer Aided Drafting - 480110

Content/Process

Students will:

1. Demonstrate and practice safe work habits in all areas at all times.
2. Demonstrate, through practice and communications, a comprehensive working knowledge of CAD drafting and the drafting symbols associated with one or more design applications.
3. Produce complex drawings through use of CAD techniques.
4. Use CAD to calculate perimeters and areas for design features.
5. Construct three-dimensional models using various techniques.
6. Project two-dimensional orthographic and axonometric views and sections off of the three-dimensional models.
7. Use advanced CAD operations.
8. Demonstrate and practice safe work habits in the lab area.

Connections

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- AutoDesk Industry Standards
- SolidWorks Industry Standards
- KCTCS Course: CAD 200
- CTSO - SkillsUSA

Internship (CAD)
Valid Course Code: 480145

Course Description: Internship provides supervised on-the-job work experience related to the student's educational objectives. Students participating in the Internship do not receive compensation.

Prerequisites: Permission of Instructor

Content/Process

Students will:

1. Demonstrate and practice safe work habits in the lab area.
2. Gain career awareness and the opportunity to test career choice(s).
3. Receive work experience related to career interests prior to graduation.
4. Integrate classroom studies with work experience.
5. Receive exposure to facilities and equipment unavailable in a classroom setting.
6. Increase employability potential after graduation.
7. Demonstrate and practice safe work habits in the lab area.
8. Gain career awareness and the opportunity to test career choice(s).

Connections

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- AutoDesk Industry Standards
- SolidWorks Industry Standards
- KCTCS Course: CAD 298
- CTSO - SkillsUSA

Introduction to Architecture
Valid Course Code: 480117

Course Description: This course provides a practical approach to architectural drafting through an introduction to board and computer aided drafting as it relates to residential and commercial architecture, specifications, and structural systems including wood, masonry, concrete, and steel.

Prerequisite: Introduction to Computer Aided Drafting - 480110

Content/Process

Students will:

1. Demonstrate and practice safe work habits in the lab area.
2. Use proper drawing setup for architectural scales.
3. Relate the design with site considerations.
4. Sketch a residential floor plan.
5. Identify floor plan symbols.
6. Identify material representations in plan and section views.
7. Apply basic dimensioning techniques.
8. Construct accompanying drawings to the floor plan - i.e. elevations and electrical plans.

Connections

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- AutoDesk Industry Standards
- SolidWorks Industry Standards
- KCTCS Course: CAD 120
- CTSO - SkillsUSA

Introduction to Computer Aided Drafting

Valid Course Code: 480110

Course Description: Students will use a computer graphic workstation in the application of fundamental principles and capabilities of CAD, basic drafting conventions, and operations. An in-depth study of computer aided drafting commands, terminology, command utilization, and skill development will be provided.	
Content/Process	
Students will: <ol style="list-style-type: none"> 1. Demonstrate and practice safe work habits in the lab area. 2. Demonstrate an understanding of orthographic projection, section, auxiliary, and pictorial views as they relate to three-dimensional objects. 3. Identify the alphabet of lines and name each lines use. 4. Use architect's, metric, civil, and mechanical drafter's scales. 5. Understand the use and purpose of a title block. 6. Demonstrate a basic understanding of dimensions and their uses. 7. Describe, using correct computer terminology, basic computer functions, uses of computers in society, and different types of software. 8. Discuss ethical computing issues, such as copyright, privacy, security, and property. 9. Use graphical user interface. 10. Use computer application programs. 11. Access information sources found on networks such as the Internet and utilize web browsers, search sources, and sources of information related to his or her own field. 12. Demonstrate an awareness of different types of software applications. 13. Produce line entities using various coordinate techniques. 14. Construct geometric shapes in two-dimensional space. 15. Develop detailed orthographic views as required. 16. Construct cross sections of various designs with cross-hatching incorporated as desired. 17. Apply dimensions and annotations to drawings. 18. Move, copy, delete, and save drawings or portions of drawings. 19. Use CAD to manipulate drawings by means of translation, rotation, scaling, zooming, panning, and windowing. 20. Explore 3-D drawing techniques. 	
Connections	
<ul style="list-style-type: none"> • Common Core Standards • KOSSA • Common Core Technical Standards • New Generation Science Standards • AutoDesk Industry Standards • SolidWorks Industry Standards • KCTCS Course: CAD 100 • CTSO - SkillsUSA 	

Introduction to Surveying (for CAD)

Valid Course Code: 480104

Course Description: Students are introduced to the elements of surveying including measurements, distance corrections, leveling, angles, area computation, computer calculations, topographic surveying, and electronic distance measuring instruments, construction surveying, GPS, and GIS.	
Content/Process	
Students will: <ol style="list-style-type: none"> 1. Demonstrate and practice safe work habits in the lab area. 2. Identify surveying methods and notations of measurements. 3. Analyze correction of error. 4. Identify surveying instruments. 5. Identify various methods of leveling. 6. Explain methods of traverse calculations and area computation. 7. Analyze computer calculations and omitted measurements. 8. Identify various types of surveys. 9. Explain Global Positioning System and Geographic Information Systems. 10. Identify volumes and horizontal and vertical curves. 11. Demonstrate and practice safe work habits in the lab area. 12. Identify surveying methods and notations of measurements. 13. Analyze correction of error. 14. Identify surveying instruments. 	
Connections	
<ul style="list-style-type: none"> • Common Core Standards • KOSSA • Common Core Technical Standards • New Generation Science Standards • AutoDesk Industry Standards • SolidWorks Industry Standards • KCTCS Course: CAD 108 • CTSO - SkillsUSA 	

Mechanical Design
Valid Course Code: 480135

Course Description: Students will explore the design process involved in the development of mechanical working drawings and the design principles in various manufacturing disciplines; gear drawing and design, and cam and follower drawing and design; design principles, mechanical adaptation, and their drawing practices; mechanical assemblies, machine design, power transmission, bearings, and seals in assemblies; and shop processes involved in these mechanical designs.

Prerequisite: Introduction to Computer Aided Drafting - 480110

Content/Process

Students will:

1. Demonstrate and practice safe work habits in the lab area.
2. Construct mechanical working drawings.
3. Construct gear drawing.
4. Construct cam and follower drawings.
5. Solve mechanical problems related to gears and cams.
6. Select appropriate gears from vendor catalogs.
7. Construct mechanical power transmission drawings.
8. Construct assembly drawings using bearings and seals.
9. Demonstrate knowledge of shop processes.

Connections

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- AutoDesk Industry Standards
- SolidWorks Industry Standards
- KCTCS Course: CAD 222
- CTSO - SkillsUSA

Parametric Modeling

Valid Course Code: 480136

Course Description: This course introduces Parametric Modeling and Design of a CAD workstation in exploring the techniques associated with drafting and design using Parametric modeling software. Introduces creation of parametric models and explores associative function and flexibility of concurrent part design.

*Prerequisite: Introduction to Computer Aided Drafting - 480110 or
Intermediate Computer Aided Drafting - 480112*

Content/Process

Students will:

1. Demonstrate and practice safe work habits in the lab area.
2. Demonstrate an awareness of the terminology and concepts of Parametric Modeling.
3. Demonstrate basic parametric modeling procedures.
4. Demonstrate the ability to create parametric sketches.
5. Create fully constrained sketches.
6. Apply/modify geometric constraints and dimensions to capture and alter the design geometry of the part.
7. Demonstrate through practice, the construction of simple parametric solid models.
8. Demonstrate the ability to perform feature-based modeling operations on parts.
9. Perform analyses on the model.
10. Perform simple assembly modeling.
11. Create desired working drawing layouts and dimensioned views from parametric solids.

Connections

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- AutoDesk Industry Standards
- SolidWorks Industry Standards
- KCTCS Course: CAD 201
- CTSO - SkillsUSA

Special Problems (CAD)
Valid Course Code: 480179

Course Description: This course allows the student to gain intermediate experience in their perspective fields through projects and tasks assigned by the instructor and based on applications the student may experience as a professional. Sets the foundation for more in-depth projects that will be included in the student's future portfolio. Focuses on various assignments and curriculum as determined by the program instructor.

Prerequisite: Permission of Instructor

Content/Process

Students will:

1. Demonstrate and practice safe work habits in the lab area.
2. Expand their portfolio of CAD drawings to enhance career opportunities.
3. Discuss occupation opportunities.

Connections

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- AutoDesk Industry Standards
- SolidWorks Industry Standards
- KCTCS Course: CAD 293
- CTSO - SkillsUSA